Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

The effect of realistic energy dependent gamma-coefficients on heating dynamics and process control in capacitive radio frequency plasmas MANASWI DAKSHA, West Virginia University, ARANKA DERZSI, IHOR KOROLOV, ZOLTAN DONKO, Hungarian Academy of Sciences, EDMUND SCHUENGEL, JULIAN SCHULZE, West Virginia University — In most PIC/MCC simulations of capacitively coupled plasmas (CCPs), only ion induced secondary electron emission from boundary surfaces is included. The corresponding emission probability, γ, is assumed to be constant and independent of the ion energy and surface conditions. It is usually guessed to be 0.1. However, in reality, γ-electron emission is known to be energy dependent and to be induced by fast atom impact and other processes, too. Here, we demonstrate that including realistic energy dependent γ-coefficients due to ion and fast atom impact strongly affects a variety of crucial plasma parameters under different discharge conditions: In single frequency CCPs operated in Argon at 13.56 MHz, the plasma density, ion flux, and electron heating mode are found to be significantly affected by including realistic emission coefficients. In dual-frequency CCPs driven at 2 MHz and 27 MHz, the separate control of the mean ion energy and flux is demonstrated to be sensitive to a realistic modeling of secondary electron emission. By switching individual processes on and off in the simulation, we identify the dominant physical mechanisms causing these effects.

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Date submitted: 11 Jun 2015 Electronic form version 1.4